CLAIMS

1. A thin film patterning substrate, used for forming thin films into patterns by an ink jet method, on surface whereof are formed banks of a prescribed height and areas to be coated partitioned by said banks, characterized in that:

when width of said bank is made a (μm), height thereof is made c (μm), width of said areas to be coated is made b (μm), and ink jet liquid droplet diameter of liquid material forming thin film is made d (μm), said bank is formed so as to satisfy relationship $d/2 < b < 5d$.

2. The patterning substrate according to claim 1, characterized in that said banks are formed so as to satisfy relationship $a > d/4$.

3. The thin film element according to claim 1 ~~or 2~~, characterized in that said banks are formed so as to satisfy relationship $c > t_0$ (where t_0 (μm) is film thickness of thin film layer).

4. The thin film patterning substrate according to ~~any one of~~ claims 1 ~~to 3~~, characterized in that said banks are formed so as to satisfy relationship $c > d/2b$.

5. The thin film patterning substrate according to ~~any one of~~ claims 1 ~~to 4~~, characterized in that at least upper surfaces of said banks are formed of an organic substance.

6. The thin film patterning substrate according to ~~any one of~~ claims 1 ~~to 4,~~ characterized in that upper surfaces and side surfaces of said banks are formed of an organic substance.

7. The thin film patterning substrate according to ~~any one of~~ claims 1 ~~to 4~~, characterized in that said banks are formed in two layers comprising a lower-layer inorganic substance and an upper-layer organic substance.

8. The thin film patterning substrate according to claim 7, characterized in that said banks are formed in two layers comprising a lower-layer inorganic substance and an upper-layer organic substance, and at least side surfaces of said inorganic substance are not covered by said organic substance.

9. The thin film patterning substrate according to ~~any one of~~ claims 1 ~~to 8~~, characterized in that said areas to be coated are of an inorganic substance.

10. The thin film patterning substrate according to ~~any one of~~ claims 1 ~~to 9~~, characterized in that upper surfaces of upper portions of said banks have liquid droplet reservoir structures.

11. The thin film patterning substrate according to ~~any one of~~ claims 5 ~~to 10~~, characterized in that surface treatment is performed so that angle of contact of organic substance surface forming said banks is 50° or greater, angle of contact with inorganic substance forming said banks is 20° to 50°, and

angle of contact of surfaces of said areas to be coated with said thin film liquid material is 30° or greater.

12. The thin film patterning substrate according to claim 11, characterized in that said surface modification is effected by plasma treatment.

13. A thin film formation method for forming patterns of thin films by an ink jet method, using the thin film patterning substrate cited in ~~any one of~~ claims 1 ~~to 12~~.

14. A thin film element formed by the thin film formation method cited in claim 13.

15. The thin film element according to claim 14, characterized in that said thin film element is an organic EL element wherein organic thin films having light-emission colors selected from among red, green, and blue are independently patterned.

16. The thin film element according to claim 14, characterized in that said thin film element is a color filter wherein organic thin films that transmit only light-emission selected from among red, green, and blue are independently patterned.

17. A display device comprising a thin film element cited in ~~any one of~~ claims 1 ~~to 16~~.

18. An electronic display unit comprising the display device cited in claim 17 and a circuit device for said display device.

19. A thin film patterning substrate, used for forming thin films in patterns by a dip process or spin-coating process, on surface whereof are formed banks of a prescribed height and areas to be coated partitioned by said banks, characterized in that:

at least surfaces of said banks are formed of an organic substance, and said areas to be coated are formed of an inorganic substance.

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20. A thin film patterning substrate, used for forming thin films in patterns by a dip process or spin-coating process, on surface whereof are formed banks of a prescribed height and areas to be coated partitioned by said banks, characterized in that:

upper surfaces and side surfaces of said banks are formed of an organic substance, and said areas to be coated are formed of an inorganic substance.

21. A thin film patterning substrate, used for forming thin films in patterns by a dip process or spin-coating process, on surface whereof are formed banks of a prescribed height and areas to be coated partitioned by said banks, characterized in that:

said banks are formed in two layers comprising a lower-layer inorganic substance and an upper-layer organic substance, and said areas to be coated are formed of an inorganic substance.

22. The thin film patterning substrate according to claim 21, characterized in that at least side surfaces of lower layer of said banks are not covered by said organic substance.

23. The transistor patterning substrate according to ~~any one of~~ claims 19 ~~to 22~~, characterized in that surface treatment is performed so that angle of contact of organic substance surface forming said banks is 50° or greater, angle of contact with inorganic substance forming said banks is 20° to 50°, and angle of contact of surfaces of said areas to be coated with said thin film liquid material is 30° or less.

24. The thin film patterning substrate according to claim 23, characterized in that said surface modification is effected by plasma treatment.

25. A thin film formation method for forming thin films in patterns by a dip process or spin-coating process using the thin film patterning substrate cited in ~~any one of~~ claims 19 ~~to 24~~.

26. The thin film formation method according to claim 25, characterized in that value of surface tension of liquid material used in said dip process or said spin-coating process is 30 dyne/cm or less.

27. A thin film element formed by the thin film formation method cited in claim 25 ~~or 26~~.

28. A display device comprising the thin film element cited in claim 27.

29. An electronic display unit comprising the display device cited in claim 28 and an electronic circuit for said display device.

30. A thin film formation method for filling areas enclosed by banks with a liquid thin film material to form thin film layers, comprising:

a bank formation process for forming said banks of an organic material on a bank formation surface configured of an inorganic material;

a surface treatment process for performing a prescribed surface treatment on said banks and said bank formation surface under certain conditions wherewith, when said surface treatment has been performed, degree of non-affinity for said liquid thin film material exhibited by said organic material becomes higher than that exhibited by said inorganic material; and

a thin film layer formation process for filling areas enclosed by banks subjected to said surface treatment with said liquid thin film material to form thin film layers.

31. The thin film formation method according to claim 30, characterized in that said surface treatment is a reduced-pressure plasma treatment wherewith plasma irradiation is conducted in a reduced-pressure atmosphere, using as induction gas, a gas containing fluorine or a fluorine-based compound.

32. The thin film formation method according to claim 30, characterized in that said surface treatment is an atmospheric-pressure plasma treatment wherewith plasma irradiation is conducted in an atmospheric-pressure atmosphere, using as induction gas a gas containing fluorine or a fluorine-based compound.

33. The thin film formation method according to claim 31 ~~or claim 32~~, characterized in that said certain conditions are that quantity of said fluorine-based compound is greater than that of oxygen.

34. The thin film formation method according to claim 33, characterized in that said certain conditions are that quantity of said fluorine-based compound contained is set at 60% or less of total quantity of fluorine-based compound and oxygen.

35. The thin film formation method according to claim 31 ~~or 32~~, characterized in that said gas used containing fluorine or a fluorine-based compound is a halogen gas such as CF_4, SF_6, or CHF_3.

36. The thin film formation method according to claim 30, characterized in that conditions for said surface treatment are set so that angle of contact of said liquid thin film material for said bank formation surface becomes 20 degrees or less.

37. The thin film formation method according to claim 30, characterized in that conditions for said surface treatment

are set so that angle of contact of said liquid thin film material for said bank formation surface becomes 50 degrees or greater.

38. The thin film formation method according to claim 30, characterized in that said bank formation process forms said banks into two layers, comprising an upper layer and a lower layer.

39. The thin film formation method according to claim 38, characterized in that said bank formation method comprises a lower layer film formation process for forming a lower layer film on said bank formation surface, an upper layer formation process for forming an upper layer on said lower layer film in conformity with areas wherein said banks are formed, and a removal process for etching and removing said lower layer film from areas where said upper layer is not provided, using said upper layer as a mask.

40. The thin film formation process according to claim 38, characterized in that said bank formation process comprises a lower layer film formation process for forming a lower layer film on said bank formation surface, a process for exposing and developing said lower layer film in conformity with areas wherein said lower bank layer is formed, an upper layer film formation process for forming an upper layer film that covers said lower layer, and a process for exposing and developing said upper layer film in conforming with areas where said upper bank layer is formed.

41. The thin film formation method according to claim 38, characterized in that said surface treatment sets affinity for said liquid thin film material in said lower bank layer at or below that of said pixel electrode and at or above that of said upper bank layer.

42. The thin film formation method according to claim 38, characterized in that conditions of said surface treatment are set so that surface of said upper bank layer subtends an angle of contact with said liquid thin film material of 50 degrees or greater.

43. The thin film formation method according to claim 38, characterized in that conditions of said surface treatment are set so that surface of said lower bank layer subtends an angle of contact with said liquid thin film material that is within a range of 20 to 40 degrees.

44. The thin film formation method according to claim 30 ~~to claim 43~~, characterized in that pixel electrodes are provided in areas enclosed by said banks, and said liquid thin film material is an organic semiconductor material for forming a thin film light emitting element.

45. The thin film formation method according to claim 44, characterized in that said pixel electrodes are ITO electrode films.

46. The thin film formation method according to claim 30, characterized in that said banks are of an insulating organic material such as a polyimide.

47. The thin film formation method according to claim 38, characterized in that said lower bank layer is either a silicon oxide film, a silicon nitride film, or amorphous silicon.

48. A display device manufactured by the thin film formation method cited in ~~any one of~~ claim~~s~~ 30 ~~to 47~~.

49. A surface modification method for filling areas enclosed by banks formed on a substrate with a liquid thin film material, comprising:

a first process for performing an oxygen gas plasma treatment on said substrate whereon said banks are formed; and

a second process for performing thereon, consecutively, after said first process, a fluorine-based gas plasma treatment.

50. The surface modification method according to claim 49, characterized in that plasma treatment in at least either said first process or said second process is an atmospheric-pressure plasma [treatment] conducted under atmospheric pressure.

51. The surface modification method according to claim 49, characterized in that plasma treatment in at least either said first process or said second process is a reduced-pressure plasma [treatment] conducted under reduced pressure.

52. A surface modification method for filling areas enclosed by banks formed on a substrate with a liquid thin film material, comprising:

a process for performing a fluorine-based gas plasma treatment on said substrate whereon said banks are formed.

53. The surface modification method according to claim 52, characterized in that said plasma treatment is a reduced-pressure plasma [treatment] performed under reduced pressure.

54. The surface modification method according to ~~any one of~~ claim~~s~~ 49 ~~to 53~~, characterized in that said substrate is an inorganic substance.

55. The surface modification method according to ~~any one of~~ claim~~s~~ 49 ~~to 53~~, characterized in that, in said banks formed on said substrate, at least upper surfaces of said banks are formed of an organic substance.

56. The surface modification method according to ~~any one of~~ claim~~s~~ 49 ~~to 53,~~ characterized in that, in said banks formed on said substrate, upper surfaces and side surfaces of said banks are formed of an organic substance.

57. The surface modification method according to ~~any one of~~ claim~~s~~ 49 ~~to 53,~~ characterized in that, in said banks formed on said substrate, said banks are formed in two layers comprising a lower layer inorganic substance and an upper layer organic substance.

58. The surface modification method according to ~~any one of~~ claim~~s~~ 49 ~~to 53~~, characterized in that, in said banks formed on said substrate, said banks are formed in two layers comprising a lower layer [in]organic substance and an upper

layer organic substance, and at least side surfaces of said inorganic substance are not covered by said organic substance.

59. The surface modification according to claim 54, characterized in that substrate surface formed of said inorganic substance is made to exhibit liquid affinity.

60. The surface modification method according to ~~any one of~~ claims 55 ~~to 58~~, characterized in that surfaces of organic substance forming said banks are made to exhibit liquid repellency.

61. The surface modification according to claim 60, characterized in that surfaces of organic substance forming said banks are Teflon-treated.

62. The surface modification method cited in ~~any one of~~ claims 49 ~~to 61~~, characterized in that surfaces of organic substance forming said banks are made to exhibit liquid repellence, and surface of substrate formed of said inorganic substance is made to exhibit liquid affinity.

63. The surface modification method according to claim 59, characterized in that angle of contact of said liquid thin film material for said substrate surface is 30 degrees or less.

64. The surface modification method according to claim 60, characterized in that angle of contact of said liquid thin film material for surfaces of organic substance forming said banks is 50 degrees or greater.

65. The surface modification method according to claim 62, characterized in that angle of contact of said liquid thin

film material for said substrate surface is 30 degrees or less, and for surfaces of organic substance forming said banks is 50 degrees or greater.

66. The surface modification method according to ~~any one of~~ claims 49 ~~to 65~~, characterized in that angle of contact of said liquid thin film material for said substrate surface is 30 degrees or less, for surfaces of lower layer forming said banks is 20 to 50 degrees, and for surfaces of organic substance forming said upper bank layer is 50 degrees or greater.

67. A thin film formation method for filling areas enclosed by banks formed on a substrate with a liquid thin film material and forming a thin film, comprising:

a process for filling said areas enclosed by sand banks on said substrate subjected to surface modification as cited in ~~any one of~~ claims 49 ~~to 66~~ with said liquid thin film material by an ink jet method, immediately after said surface modification.

68. A thin film formation method for filling areas enclosed by banks formed on a substrate with a liquid thin film material and forming a thin film, comprising:

a process for filling said areas enclosed by sand banks on said substrate subjected to surface modification as cited in ~~any one of~~ claims 49 ~~to 66~~ with said liquid thin film material by a spin-coating method or dip method, ~~etc.,~~ immediately after said surface modification.

69. A display device comprising a thin film or films formed by the thin film formation method cited in claim 67 ~~or claim 68~~.

70. The display device according to claim 69, characterized in that said display device is a color filter.

71. The display device according to claim 69, characterized in that said display device is an organic EL element.

72. A manufacturing method for a display device wherein a thin film or films are formed by the thin film formation method cited in claim 67 ~~or claim 60~~.

73. The display device manufacturing method according to claim 69, characterized in that said display device is a color filter.

74. The display device manufacturing method according to claim 69, characterized in that said display device is an organic EL element.

75. The patterning substrate according to claim 1, characterized in that horizontal shape of portions enclosed by said banks is circular or elliptical.

76. A thin film patterning substrate having a substrate and banks formed on said substrate in a prescribed pattern, characterized in that openings in said banks are formed in a ring shape.

77. The patterning substrate according to claim 76, characterized in that openings in said banks are formed in a circular or elliptical shape.

78. An EL element having a substrate, banks of a prescribed pattern shape on said substrate, and thin films of a light emitting material in areas enclosed by said banks, characterized in that shape of openings in said banks is formed in a ring shape.

79. The EL element according to claim 78, characterized in that shape of opening in said ring shape is circular or elliptical.

80. (additional) A surface modification method for filling areas enclosed by banks in a substrate with a liquid thin film material, characterized in that:

a series of surface modification treatments is performed uniformly over entire surface of said substrate whereon said banks are formed; and

non-affinity of bank surfaces for said liquid thin film material is raised relative to that of surfaces between said banks.